

# NAVY PROGRAMS

## SSN 774 *Virginia* Class

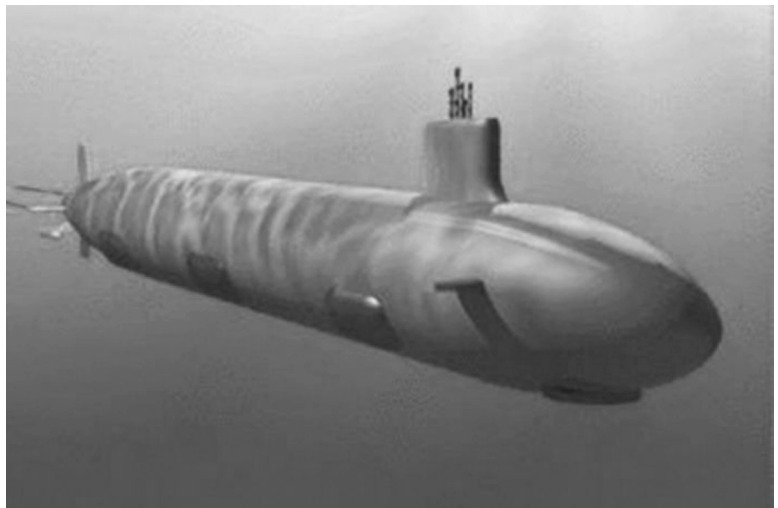
*Virginia* will replace the aging fleet of *Los Angeles* (SSN 688) Class submarines. It is intended to be a submarine comparable in most respects to its immediate predecessor, the *Seawolf*, but in a more affordable configuration. The missions of *Virginia* include Covert Strike Warfare, Anti-Submarine Warfare, Covert Intelligence Collection/Surveillance, Covert Indication and Warning and Electronic Warfare, Anti-Surface Ship Warfare, Special Warfare, Covert Mine Warfare, and Battle Group Support.

*Virginia* is required to be capable of targeting, controlling and launching MK 48 Advanced Capability Torpedoes, mines, and Tomahawk missiles. Its sonar capability is expected to be similar to *Seawolf*'s, and its electronic support suite and combat control system represent improvements over legacy systems. The external communications system is required to be an improvement over *Seawolf* and legacy systems, providing full, high data rate interoperability with U.S. and allied forces. These characteristics support intelligence and strike capabilities.

The Milestone I Defense Acquisition Board (DAB) approved *Virginia* to enter Phase I in August 1994. To support Milestone II, an Early Operational Assessment was conducted, concluding that *Virginia* was potentially operationally effective. The Milestone II DAB approved entering Phase II in June 1995.

DOT&E recommended, and the Secretary of Defense approved, a waiver from full-up, system-level live fire testing of *Virginia* in accordance with Title 10, Section 2366. DOT&E approved the alternative Live Fire Test and Evaluation (LFT&E) plan submitted in lieu of full-up, system-level testing in June 1995. This plan includes shock qualification tests and analysis of components, surrogate underwater shock tests, a Total Ship Survivability Trial (TSST), a Full Ship Shock Trial, as well as a series of vulnerability assessments.

The *Virginia* Class (SSN 774) submarine combat control system is being integrated outside of the ship's hull. For instance, sonar displays and processors, ship control, navigation, and combat control stations, radio room and electronic support measures (ESM) equipment, and the horizontal large scale display are being electronically integrated on a rafted system that will be inserted into the *Virginia* hull. This construction technique has afforded the Navy Commander of Operational Test and Evaluation Forces (COMOPTEVFOR) a unique opportunity to conduct early operational testing (designated Operational Test-IIB) of the command and control system module (CCSM) at the CCSM Off-hull Assembly and Test Site (COATS) at the Electric Boat Corporation in Groton, Connecticut. Upon completion of testing, the CCSM will be placed on the building way, hull sections will be welded around it, and the assembly will be integrated into the rest of the hull.



*Artist Conception of Virginia Submarine*

### TEST & EVALUATION ACTIVITY

For Operational Test-IIB, the combat system module was stimulated on the factory floor by an on-board trainer and simulation/stimulation system that provided the required interfaces. Most of the data were synthetic representations of acoustic, Radio Frequency, and visual

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scenarios of combat situations. Navy officer and enlisted operators were trained in the system operations and were free to operate the “ship” (choose ship courses, speeds, and depths, and simulate weapon firings) in a manner that they chose to defeat the enemy.

The Navy continued its vulnerability assessment work for LFT&E. DOT&E reviewed and commented on the interim vulnerability assessment report. DOT&E continued to participate in *Virginia* LFT&E Senior Working Group meetings and TSST Planning Group meetings to review Live Fire data and provided advice on Navy plans for other planned LFT&E activities. DOT&E witnessed component shock qualification tests, and reviewed with the Navy the results of completed Live Fire component and surrogate tests.

## TEST & EVALUATION ASSESSMENT

The COATS test (Operational Test-IIB) included a variety of warfare scenarios, including Anti-Submarine Warfare, Anti-Surface Warfare, strike, and surveillance. A number of different test sites, acoustic environments, and weather conditions were simulated. There was generally good coordination in the simulation of the radar, visual, and ESM signatures associated with the targets of interest.

Based on Operational Test-IIB testing, early assessments of the operability and interoperability of sonar, fire control, navigation, and photonics mast subsystems were completed by COMOPTEVFOR. Overall, the test was well conceived and professionally executed, and provided timely results that should be utilized to improve the system.

COATS testing focused on the electronics systems, but a group of experienced submariners in the CCSM provided for an informal assessment of the ship’s spaces and fittings. The universal complaint was about the cramped layout. The control room and associated spaces were constructed as a freestanding module, instead of built into the hull itself and some internal volume is lost to the module framework, reducing overall usable volume. The cramping is especially obvious in the berthing area on the upper deck of the CCSM. There, the passageways have been reduced to a mere 18 inches, which may constitute a safety hazard in the event of a casualty.

The Navy has evaluated six damage scenarios for the detail design vulnerability assessment report using linear extrapolation to 10 percent above the design level. The assessment at this level of shock intensity resulted in very limited damage and few lessons learned. The Navy is planning to use a “Meaningful Drill Concept” derived from Fleet tactical readiness evaluation drills in developing the post-delivery TSST damage scenarios that will be linked with the six shot lines.

As with *Seawolf*, there is a deficiency in the LFT&E plan for *Virginia* regarding the availability of survivability data for reactor plant systems. The Director, Naval Nuclear Propulsion Systems and DOT&E continued work toward an agreement to provide sufficient information for DOT&E to perform its statutory requirement to assess the survivability of the entire ship.

Additional LFT&E concerns include: the approach for Verification, Validation, and Accreditation of LFT&E computer models has not been described; and *Virginia*’s ability to surface after exposure to an underwater burst at the hull integrity shock factor level may not be assessed.